



ANNUAL REPORT

CY 2022

(JANUARY 2022 - DECEMBER 2022)



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Letter from the CEO

Dear friends and colleagues,

I am pleased to present to you Parallax Advanced Research's CY 2022 annual report.

This past year has been one of tremendous progress and growth for Parallax. In our second year, we refocused on advancing the Nation's innovation advantage through novel and mission-critical science, technology, research, and development solutions. We conducted groundbreaking research in the areas of artificial intelligence (AI) and autonomy, human and machine cognition, and unmanned systems command and control. We continue to make vital contributions to innovation ecosystems, expanding our network of collaborators from industry, academia, and government across Ohio and the Nation. This led to new science and technology wins and funding for our state. We've grown our workforce, not only by the numbers but by our investment in our people to learn new skills and achieve their career goals while at Parallax and beyond. This report highlights our impact in these areas and more.

As we reflect on the successes of the past year, I am proud and humbled by the hard work and dedication of our team. I am also grateful to our many partners and collaborators. We would not have been able to achieve this without the support of all Parallaxians, our board members, national and Ohio-based clients and partners, and the Dayton community. It's with this tremendous support that we realize our goals and aim for more ambitious ones.

We are honored to have been able to make such a meaningful contribution to Ohio and the Nation. We look forward to creating continued impact in the years to come.

Sincerely,

Dennis Andersh



President and Chief Executive Officer
Parallax Advanced Research

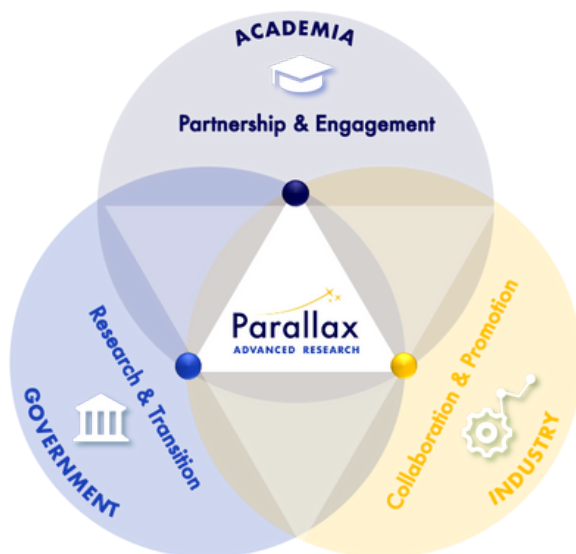


Who We Are

The United States' position as a world leader in science and technology is critical to ensuring economic prosperity, industrial resilience, and national security. This requires investment in research and development, access to capital and resources, thoughtful economic development initiatives, and collaboration between public and private sectors. It's at the intersection of these efforts where Parallax Advanced Research excels.

Parallax is a 501(c)(3) nonprofit research institute that is advancing the Nation's innovation advantage by delivering innovative research and providing technology, human, and business solutions via The Science of Intelligent Teaming™ for government, industry, and academic clients. Parallax builds teams – whether they're human-machine, machine-machine, or human-human – to engage in boundary-spanning activities that support the U.S. science and technology enterprise.

Triple Helix Collaboration Produces Results



Parallax creates impact in two ways. First, Parallax engages in research and development that aims to create breakthrough technologies across land, sea, air, and space. Parallax's research and development strengths include artificial intelligence and autonomy, human and machine cognition, and unmanned systems command and control. Second, Parallax supports innovation ecosystems by providing quality consulting services and managing a suite of entrepreneur and research networks. Together, with state and federal partners, Parallax combines resources, competencies, and perspectives across government, industry, and academia to enhance collaboration and drive innovation activities, including technology transition, economic development, and entrepreneur support.

By leveraging its expertise in advanced R&D and science and technology innovation, Parallax provides the US with tools and resources necessary to remain at the forefront of innovation and advance the US' innovation advantage.



Parallax won a highly competitive contract with the potential value of \$97.25M from the Air Force Research Laboratory (AFRL) to support the development of the Mission Analytics Technology and Research for Innovative eXploitation (MATRIX) Program. It is Parallax's largest award to date. The Program research continues an eight-year relationship between Parallax and AFRL, allowing for continuity of research and capabilities. The contract will engage 17 small and large subcontractors to complete the work, resulting in \$87 million in payroll over the next seven years.



Parallax was awarded a contract with the potential value of \$6M to provide basic and advanced research on executive control for autonomous systems. The Science and Technology for Autonomous Teammates (STAT) research project continues a three-year relationship with the customer at the Air Force Research Laboratory.



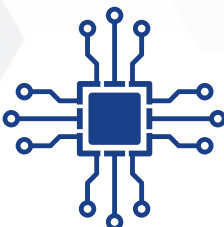
Parallax was selected by the DARPA Technology Transition Office to execute a project called Strategic Chaos Engine for Planning, Tactics, Experimentation, and Resiliency or SCEPTER. The project has the potential value of \$4.4M and was the first Parallax contract with DARPA.



Parallax won a contract supporting Air Force Special Operations Command (AFSOC) missions concerning the command and control of Unmanned Aerial Vehicles (UAVs). Parallax scientists will develop, integrate, and maintain flight control software for multiple, heterogeneous UAVs through a single integrated interface. Throughout the year, Parallax tested and demonstrated capabilities on new aircraft, sensors, and operations concepts, totaling more than 700 flight hours. Parallax also expanded its flight testing capabilities to include testing multiple, competing autonomous algorithms and testing long-endurance flight concepts.



Parallax won its second award with DARPA in 2022 called 'In the Moment' (ITM) - potential value estimated at \$6.96M. ITM aims to aid decision makers in places of ambiguity where there is no right decision. The Parallax research team is working on human aligned algorithmic decision-making that aims to enable a user's effective use of available resources to make the best decisions for both triage and injury care in the battlefield. Parallax is partnering with Drexel University and Knexus Research Corporation on the development of ITM.



Since 2020, Parallax has been in a partnership with the Air Force Research Laboratory's Sensors Directorate and the DoD Trusted and Assured Microelectronics (ME) Program to support microelectronics workforce development. In 2022, total funding of \$1.5M was received to support the drafting of the DoD Microelectronics Workforce Development Strategic Plan; a needs assessment to determine ME workforce gaps across the DoD; a portal that highlights ME education, training, and other workforce opportunities; and hosting of the 2023 Microelectronics Workforce Strategy Forum.

Dr. Matt Molineaux selected for DARPA Risers program



Dr. Matt Molineaux
Director of Artificial Intelligence &
Autonomy Research
Parallax Advanced Research

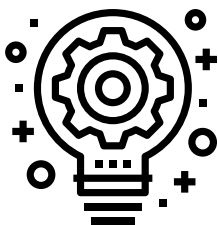
Dr. Matt Molineaux, Director of Artificial Intelligence and Autonomy was selected for the Defense Advanced Research Projects Agency (DARPA) Risers Program 2022 cohort.

The Risers program selects researchers and innovators whose work is of significance to national security and gives them an opportunity to be recognized for their outstanding work and present their ideas to DARPA program managers. Individuals selected for the program become members of the DARPA Risers class and present their ideas at assigned venues.

Dr. Molineaux's nomination was a result of his work on "Testing AI Learning in Open-world Novelty Scenarios (TALONS)," a novelty generation and evaluation verification and validation system for artificial intelligence. The purpose of TALONS is to future-proof AI by preparing it for potentially unknown circumstances and dynamics relevant to an agent's operation.

"Through our work on TALONS, we have created a domain-independent novelty generator and have formal documents that describe how novelty operates."

Independent Research and Development



Parallax Advanced Research conducted several future-focused projects through its Independent Research and Development (IRAD) program. This signature innovation program funds short-duration research and development projects that provide insight, evidence, or intellectual property of potential interest to government customers.

All large research organizations have robust IRAD programs. What's rarer is when smaller organizations like Parallax have an IRAD program where funding is allocated to independent research. At Parallax, IRAD is an important component of its innovation culture. The funding allows Parallax employees the opportunity to pursue interesting and complex projects that may be of potential federal government interest.

Parallax funded four IRAD projects, leading to the development of new capabilities, including trust in automation, novel strategies for AI training, planning and replanning methods, and UAV flight control.

Innovation Spotlight: “Fast Recovery via Intrinsic Goals Applied to Exploration” (FRIGATE)

FRIGATE is led by scientists Dr. Dustin Dannenhauer, Dr. Matthew Molineaux, and Dr. Mary Frame. The objective of FRIGATE is to develop new artificial intelligence exploration learning capabilities that allow agents to guide their own learning.

Research for FRIGATE is like intrinsic reinforcement learning, which involves mechanisms that induce curious agents to spontaneously learn unspecified learning goals by themselves. A general problem with reinforcement learning is the ability to conduct better, more efficient exploration. The FRIGATE system is designed to explore more states in the environment than other systems and do so faster.

Applications of this technology include recovery of vehicles if an unexpected event happens due to weather patterns, crossing enemy lines, and other complex situations in the real world. Currently a lot of assets are lost due to unexpected events, however with FRIGATE, the system can detect something strange is going on in an unknown situation and turn on this learning capability to recover it when it otherwise couldn't.

Preliminary results for FRIGATE were presented at the Ninth Annual Conference on Advances in Cognitive Systems. The paper presentation, titled “Self-directed Learning of Action Models using Exploratory Planning,” can be found using the QR code below:



Innovation spotlight: Evolving Group Goal Networks from Observations on the Ground” (EGGNOG)

EGGNOG is led by scientist Dr. Van Parunak. At the heart of EGGNOG is a social simulator called “Social Causality with Agents using Multiple Perspectives (SCAMP).” SCAMP is a psychologically and socially realistic simulator that can model how people make decisions. Parallax scientists constructed SCAMP under a previous DARPA program called “Ground Truth.” EGGNOG aims to demonstrate how SCAMP’s Hierarchical Goal Networks (HGN) can be evolved to match observed behavior.

To achieve the project’s objective, researchers apply genetic search to grow HGNs that generate observed behavior in a simulation. The expected result is to generate the ability to fit SCAMP models to observed behavior.

Products of EGGNOG have a diverse set of potential customers, including DARPA; the National Weather Service, for finding a method to modulate response to weather models; and advertisers seeking to predict behavior as the result of decisions and actions.

Results from Dr. Parunak’s work are published in two conference papers, “Model Mechanisms and Behavioral Attractors” at the Social Simulation Conference and “Interactions, Model Mechanisms, and Behavioral Attractors in Complex Social Systems” at the Computational Social Science Society of the Americas.



Ohio Federal Research Network (OFRN)



The Ohio Federal Research Network (OFRN) is a science and technology enhancement program managed by Parallax Advanced Research in collaboration with The Ohio State University and funded by the Ohio Department of Higher Education. OFRN's mission is to stimulate Ohio's innovation economy by building vibrant, statewide university-industry research collaborations that meet the requirements of Ohio's federal laboratories, resulting in the creation of leading-edge technologies that drive job growth for our state.

OFRN work includes:

- Funding and facilitating statewide R&D projects that are focused on fulfilling the critical mission needs of Ohio's federal installations.
- Promoting and facilitating the successful commercialization and/or follow-on funding of the R&D projects
- Increasing Small Business Innovation Research and Technology Transfer (SBIR/STTR) connectivity
- Increasing federal Broad Area Announcement (BAA) awareness, connectivity, teaming, and proposal support through OFRN Opportunity Days

Impact in 2022 alone

OFRN supported 16 active projects, which accomplished the following:



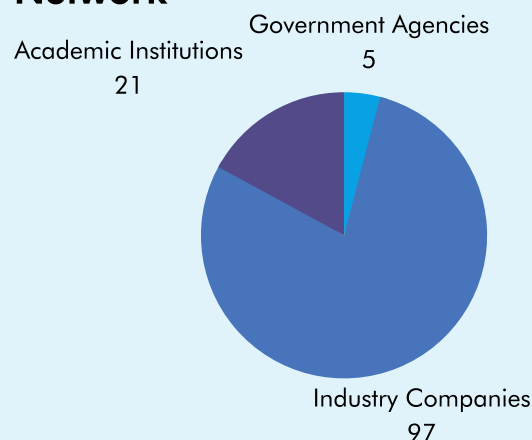
Nine of 16 active projects concluded in 2022. Since their inception, these projects have achieved:



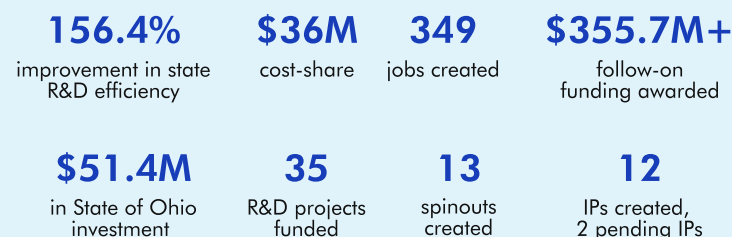
OFRN's historical impact

Since its launch in 2015, OFRN supported the advancement of R&D startups, university-industry collaborations, and statewide economic development.

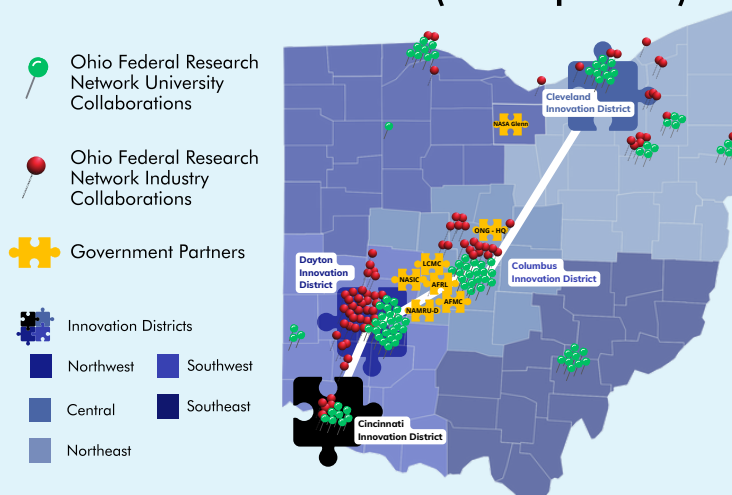
OFRN Network



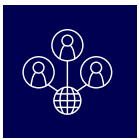
Since program inception



Distribution of OFRN university/industry collaborations across Ohio (see map below)



Launch Dayton is a partnership of 20+ entrepreneurial support organizations and programs building an intentionally inclusive community that celebrates and supports all entrepreneurs and business owners in Dayton, Ohio. Parallax Advanced Research's Launch Dayton team manages that partnership and supports the entrepreneurial community by:



Designing accessible networks

through on-ramp events like Startup Week, Startup Weekend, and other networking opportunities that serve as keystone events in the community and by sharing the success stories of the community via Launch Dayton communications.

- 19 community on-ramp events managed
- 1,374 event registrations
- 120 stories published on the community



Providing technical and business resources

by training entrepreneurs to build strong business foundations through the Entrepreneur Rising Academy and Launch Dayton Mentor Network.

- 100 entrepreneurs supported through Parallax-led programming, including:
 - 72% women and 60% minority
 - 28 graduates in the Entrepreneur Rising Academy
 - 18 entrepreneurs supported through the Launch Dayton Mentor Program



Deploying capital solutions

to support entrepreneurs and researchers to create the alpha prototype of their technologies.

- \$90K in funding support through the MedTech Launch Fund

Parallax will continue its role as a collaborator on the Dayton Region's Entrepreneurial Service Provider (ESP) Program through 2025. Led regionally by the Entrepreneurs' Center, the ESP program supports the region's technology startup ecosystem through funding from the Ohio Third Frontier which awarded the region \$15M in July of 2022.

John Owen - Dayton Business Journal's Forty Under 40



John Owen, Launch Dayton program manager, was named one of the Dayton Business Journal's 2022 Class of Forty Under 40, which recognizes the most extraordinary business and community leaders under the age of 40 in Dayton. Mr. Owen manages four federal and state grant programs at Parallax Advanced Research that support the Launch Dayton community and provides resources and opportunities for entrepreneurs in the Dayton Region.

"Our team is proud to support the entrepreneurs in Dayton, Ohio who are changing the fabric of our city. The work we've done has helped build a community that welcomes and celebrates all entrepreneurs."

Advancing the Nation's Innovation Advantage



Parallax expands footprint; opens DC-area office

Parallax opened a 2,400 square foot office in Arlington, Virginia. This office extends Parallax's geographical area of operations, helps Parallax meet its growing talent needs, and gives it a local presence to key Department of Defense agencies, including the Air Force Office of Scientific Research, Naval Research Lab, and Defense Advanced Research Projects Agency. Parallax's Virginia office is a landing point for both technical execution and business development. This new office will drive Parallax's implementation of advanced artificial intelligence capabilities in U.S. military systems. The location is also available as a collaborative space for Parallax's partners.



Dennis Andersh
President & CEO
Parallax Advanced Research

"If universities or other partners want to utilize the office while they're in D.C., it is available to them. In fact, I'd like to have national universities share that space with us, possibly as a starter office for them in D.C. DARPA is getting more engaged with academia, and we want to provide universities with a physical space for collaborative initiatives and partnerships. This aligns with Parallax's mission to be a strong partner to academia, industry, and the government."

Parallax by the numbers

20%

growth in Parallax's workforce

Staff in

17

states and Washington, DC

2

office locations: Dayton, Ohio and Arlington, VA

\$51.8M

total federal funding awarded

Parallax recognized for excellence



Parallax received a Gold Stevie Award for Organization of the Year in the Non-Profit or Government – Medium category and a second Gold Stevie Award for Sales and Customer Service as Government Sales Team of the Year. The American Business Awards are the premiere business awards program in the United States.



Parallax earned a Candid Platinum Seal of Transparency for our commitment to nonprofit transparency and accountability. Candid is the world's largest source of nonprofit information and is designed to provide stakeholders with critical information about nonprofit organizations.



Parallax Advanced Research named the 2022 Business of the Year in the not-for-profit category as well as a Best Places to Work Honoree by the Dayton Business Journal.



The Dayton Business Journal named Parallax an honoree for the 2022 Diversity in Business Awards. The awards recognize organizations that have contributed to harnessing diversity within their work forces and actively taking the lead to promote and champion the business case for diversity within the community or their industries. The Department of Defense selected Parallax as a 2022 Employer Support Freedom Award Finalist. The Employer Support Freedom Award is the highest recognition given by the Department of Defense to employers for their exceptional support of National Guard and Reserve members.

Looking Forward

In October 2021, Parallax executive leadership engaged Stretch Strategic Leaders to develop a five-year strategic plan to accelerate Parallax's growth. The process resulted in five overarching goals:

1. Establish Parallax as a globally recognized research institute
2. Become the preeminent leader of innovative public-private partnerships
3. Broaden and deepen our capabilities and expertise
4. Grow our global footprint with new labs, regional offices, and partner collaboration spaces
5. Attract and retain the best talent as an employer of choice

To accomplish this, Parallax leaders identified six priority areas:



Grow our prominence

through recognized research, a reputation for national impact, and cultivated collaboration among government, industry, and academic leaders.



Grow our talent

as an employer of choice committed to growing current staff while strategically hiring and retaining additional talent.



Grow our collaborations

by creating the best virtual work environment for our staff and partners and formalizing nationwide collaborative agreements with universities and innovation hubs.



Grow our customer impact

by exceeding our customer expectations and achieving national recognition for impact.



Grow our Business

by increasing revenue, diversifying our national security customer base, and expanding our geographic footprint.



Grow our innovation infrastructure

with world class computing, networks, labs, processes, and learning communities.

Parallax's strategic plan is an ambitious and comprehensive approach to the future of Parallax. The Parallax team is committed to growing its impact across Ohio and the Nation with the help of its partners in government, academia, and industry.

The Strategic Planning Process



Stretch Strategic Leaders is an Ohio-based consulting group led by Darcy Bien and Cyndi Wineinger. Stretch's model integrates strategy and leadership development to create healthy leaders, high performing teams, and winning strategies for their clients.



Our Leadership

Leadership Team



Dennis Andersh
President and Chief
Executive Officer



Dr. Viktoria Greanya
Chief Scientist



Mike Pearsall
Chief Operating Officer

Board of Directors



Lt. Gen. (Ret) C.D. Moore
Chair

Lt. Gen. (Ret) C.D. Moore, CEO of A3R Consulting, former chief operating officer for Caliburn International, serves on board of directors for the Parallax Research Corporation and the National Aviation Heritage Alliance. Lt. Gen. C. D. Moore served in the United States Air Force for nearly 35 years. He has operations experience leading large organizations and complex aerospace programs. He was Vice Commander of Air Force Materiel Command, the first commander of the Air Force Life Cycle Management Center, he served in the Pentagon as director of special programs in the Office of the Secretary of Defense, deployed to Baghdad during Operation Iraqi Freedom, and is an accomplished experimental test pilot with over 3,000 hours in 30+ type aircraft.



Doug Ebersole
Vice Chair



Gayle Rominger
Former Chair

Gayle Rominger served as Executive Vice President at YSI Inc, responsible for sales, marketing, strategy and business development and was a member of the YSI Board of Directors for 6 years. The company was purchased in 2011 by Xylem, a \$4B company based in New York. Following the acquisition Gayle served as Vice President of Business Development & Strategy for Xylem Analytics. Upon retirement from Xylem in 2013 Gayle has been active in the local start up community providing mentoring and angel investment for new companies. She has served on the Board of The Entrepreneur's Center for several years.

Mary Margaret Evans

Secretary

Richard Graf

Member

Wanda Gamble

Member

Gary Kessler

Member

Mike Pearsall

Treasurer

Jeff Stanley

Member

Dr. Michael Farrell

Member

Dr. Rich Joseph

Member

Llyod Fields

Member

Greg Morris

Member

Dr. Phil Perconti

Member

Mike Hripko

Member

Carmel Fritz

Member

Susan Thornton

Member

Our People

Parallax
ADVANCED RESEARCH



